

OPERATOR

Company: TDI, INC.
 Address: 1310 BISON ROAD
 HAYS, KANSAS 67601-9696

Contact Geologist: TOM DENNING
 Contact Phone Nbr: 785-628-2593
 Well Name: FURTHMYER # 4
 Location: E2 SE SW SW, SEC.23-T14S-R16W
 API: 15-051-26,935-00-00
 Pool: IN FIELD
 State: KANSAS

Field: DREILING EAST
 Country: USA



Scale 1:240 Imperial

Well Name: FURTHMYER # 4
 Surface Location: E2 SE SW SW, SEC.23-T14S-R16W
 Bottom Location:
 API: 15-051-26,935-00-00
 License Number: 4787
 Spud Date: 11/10/2018 Time: 12:30 PM
 Region: ELLIS COUNTY
 Drilling Completed: 11/15/2018 Time: 7:14 PM
 Surface Coordinates: 330' FSL & 1190' FWL
 Bottom Hole Coordinates:
 Ground Elevation: 1888.00ft
 K.B. Elevation: 1893.00ft
 Logged Interval: 2500.00ft To: 3510.00ft
 Total Depth: 3510.00ft
 Formation: ARBUCKLE
 Drilling Fluid Type: CHEMICAL/FRESH WATER GEL

SURFACE CO-ORDINATES

Well Type: Vertical
 Longitude: -99.0727798
 Latitude: 38.8137773
 N/S Co-ord: 330' FSL
 E/W Co-ord: 1190' FWL

LOGGED BY

Company: SOLUTIONS CONSULTING, INC.
 Address: 108 W 35TH
 HAYS, KS 67601

Phone Nbr: (785) 639-1337
 Logged By: GEOLOGIST Name: HERB DEINES

CONTRACTOR

Contractor: WHITE KNIGHT DRILLING LLC
 Rig #: 1
 Rig Type: MUD ROTARY
 Spud Date: 11/10/2018 Time: 12:30 PM
 TD Date: 11/15/2018 Time: 7:14 PM

ELEVATIONS

K.B. Elevation: 1893.00ft
 K.B. to Ground: 5.00ft

Ground Elevation: 1888.00ft

NOTES

RECOMMENDATION TO RUN PRODUCTION CASING BASED ON POSITIVE RESULTS OF DST # 1 AND LOG ANALYSIS.

OPEN HOLE LOGGING BY PIONEER ENERGY SERVICES: DUAL INDUCTION LOG, DUAL COMPENSATED POROSITY LOG, AND MICRORESISTIVITY LOG.

DRILL STEM TESTING BY TRILOBITE TESTING INC: ONE (1) CONVENTIONAL TEST

	FURTHMEYER # 4	FURTHMYER # 1	FURTHMYER # 3
	E2 SE SW SW	SW SW	W2 SW SE SW
	SEC.23-14S-16W	SEC.23-14-16W	SEC.23-14-16W
	KB 1893'	KB 1895'	KB 1893'
	SPL TOPS		
Anhydrite top	979+914	+ 911	+ 919
Anhydrite base	1016+877	+ 873	+ 881
Topeka	2865 -972	- 972	- 967
Heebner Sh.	3086-1193	-1189	-1193
Toronto	3106-1213	-1211	-1215
LKC	3135-1242	-1238	-1244
BKC	3366-1473	-1472	-1477
Arbuckle	3411-1518	-1500	-1503
RTD	3510-1617	-1580	-1604

SUMMARY OF DAILY ACTIVITY

- 11-10-18** RU, spud 12:30PM, set 8 5/8" surface casing to 215.32' w/ 150 sxs common 2%gel 3%CC, plug down 6:45PM. slope 1/4 degree.
- 11-11-18** 542', drilling, drill plug at 2:45AM
- 11-12-18** 1873', drilling
- 11-13-18** 2495', drilling, displaced at 2523'
- 11-14-18** 3044' drilling
- 11-15-18** 3428', CFS 3360', short trip-30 stands, CFS 3428', DST # 1 3356' to 3428' Arbuckle, slope 3/4 degree, TIWB, drilling, RTD 3510' @ 7:14PM CCH, TOWB, logs.
- 11-16-18** 3510', TIWB, LDDP, run production casing and cement, RD



**TRILOBITE
TESTING, INC.**

DRILL STEM TEST REPORT

TDI Inc.
1310 Bison Rd
Hays, Kansas
67601+9696
ATTN: Herb Dienes

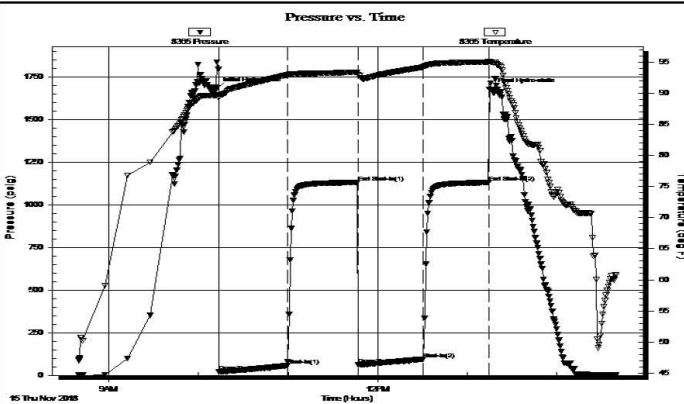
23/14S/16W/ELLIS
Furthmyer #4
Job Ticket: 64559 **DST#: 1**
Test Start: 2018.11.15 @ 08:40:00

GENERAL INFORMATION:

Formation: **Arbuckle**
Deviated: No Whipstock: ft (KB)
Time Tool Opened: 10:13:47
Time Test Ended: 14:40:02
Test Type: Conventional Bottom Hole (Initial)
Tester: Ken Swinney
Unit No: 72 Hays 30
Interval: **3356.00 ft (KB) To 3428.00 ft (KB) (TVD)**
Reference Elevations: 1893.00 ft (KB)
Total Depth: 3428.00 ft (KB) (TVD) 1888.00 ft (CF)
Hole Diameter: 7.80 inches Hole Condition: Fair KB to GR/CF: 5.00 ft

Serial #: 8365 Inside
Press@RunDepth: 95.84 psig @ 3357.00 ft (KB) Capacity: psig
Start Date: 2018.11.15 End Date: 2018.11.15 Last Calib.: 2018.11.15
Start Time: 08:40:01 End Time: 14:40:02 Time On Btm: 2018.11.15 @ 10:12:02
Time Off Btm: 2018.11.15 @ 13:16:17

TEST COMMENT: I.F. 45 Minutes/ Blow built to BOB in 45 minutes
I.S.I. 45 Minutes/ No blow back
F.F. 45 Minutes/ Blow built to 9 inches
F.S.I. 45 Minutes/ No blow back



PRESSURE SUMMARY

Time (Min.)	Pressure (psig)	Temp (deg F)	Annotation
0	1683.85	89.64	Initial Hydro-static
2	19.76	89.22	Open To Flow (1)
48	57.86	92.94	Shut-In(1)
95	1132.04	93.36	End Shut-In(1)
95	63.57	93.02	Open To Flow (2)
139	95.84	94.19	Shut-In(2)
183	1132.34	95.04	End Shut-In(2)
185	1678.85	94.97	Final Hydro-static

Recovery

Length (ft)	Description	Volume (bbl)
124.00	Oil cut Watery Mud/ O 10 W40 M50	1.74
36.00	Muddy Watery Oil/ M30 W30 O40	0.50
10.00	Mud Water cut Oil/ M10 W10 O80	0.14

Gas Rates

Choke (inches)	Pressure (psig)	Gas Rate (Mcf/d)

ROCK TYPES

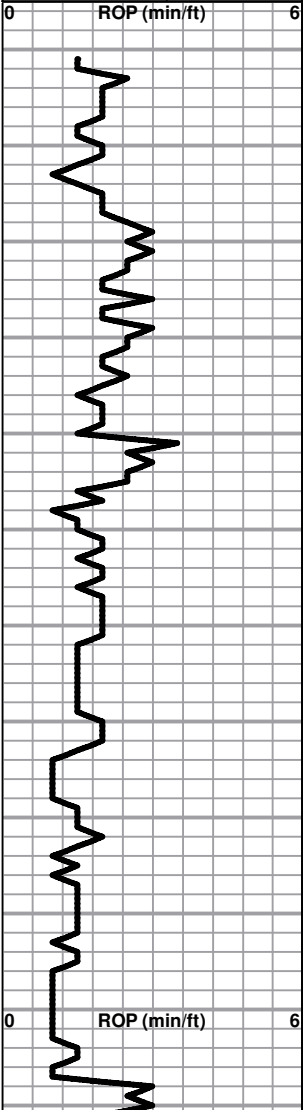
 Cht vari	 Lmst fw7>	 shale, grn	 Carbon Sh
 Dolprim	 Lscongl	 shale, gry	 shale, red

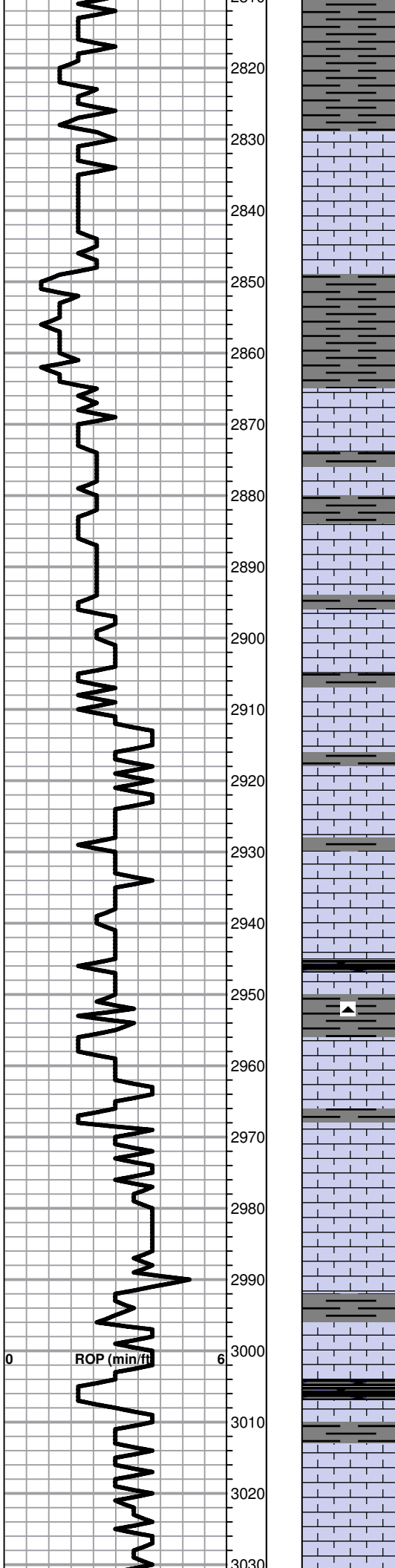
ACCESSORIES

MINERAL

▲ Chert, dark

Printed by GEOstrip VC Striplog version 4.0.8.15 (www.grsi.ca)

Curve Track #1 ROP (min/ft)	Depth Intervals DST	Lithology	Oil Show	Geological Descriptions	Curve Track #3
<p>1:240 Imperial</p>  <p>ROP (min/ft)</p>	<p>Cored Interval DST Interval</p>	<p>Lithology</p>	<p>Oil Show</p>	<p>BEGIN 1' DRILL TIME FROM 2700' TO RTD BEGIN 10' WET AND DRY SAMPLES FROM 2850' TO RTD</p> <p>ANHYDRITE SPL TOP 979+914 ANHYDRITE BASE 1016+877</p> <p>SAMPLE TOPS WERE USED IN THIS REPORT DUE TO UNRESOLVED DIFFERENCE BETWEEN LOG TOPS WHICH WERE 8'-10' HIGHER AND SAMPLE TOPS WHICH WERE LIKELY MORE ACCURATE. WELL TOTAL DEPTH WAS CONFIRMED TO BE 3510' BY TAGGING BOTTOM WITH PRODUCTION CASING PRIOR TO CEMENTING.</p>	<p>1:240 Imperial</p> <p>8 5/8" SURFACE CASING SET TO 215.32' W/ 150 SXS COMMON 2%GEL 3% CC</p> <p>SLOPE 1/4 DEGREE @ 215'</p>
<p>ROP (min/ft)</p>	<p>2800 2810</p>		<p>Oil Show</p>	<p>Lime, lt-med brn-lt gray, fnxln, fusulinids</p>	



Lime, lt brn-lt grayish brn, fn-vfxln

Lime, lt-med brn, fn-vfxln

Shale, lt-med gray, soft blocky

TOPEKA SPL TOP 2865-972

Lime, lt brn, fnxln, slight bedded chalk, NS

Lime, lt brn, fn-vfxln, thin fusulinid and fossil beds

Lime, lt-med brn, fn-vfxln

Lime, lt-med brn, fn-vfxln

Lime, lt brn, fn-vfxln, slight granular in part with sticky chalk

Lime, lt-med brn-lt grayish brn, fn-vfxln, increasing bedded chalk

Lime, crm-lt brn, fnxln-granular, chalky matrix in part with bedded chalk

Lime, lt-med brn, fn-vfxln
Shale, black carbonaceous, blocky

Lime, crm, fnxln, lithographic

Lime, lt-med brn, fn-micro xln

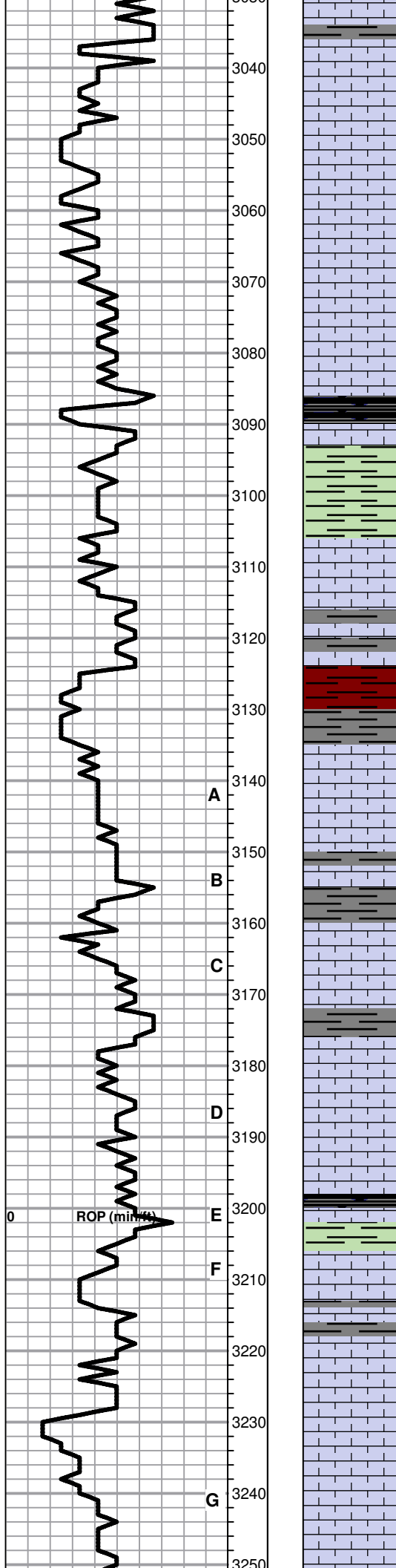
Lime, crm-lt-med brn, fn-micro xln

Lime, crm-lt brn, fnxln to granular in part with bedded chalk

Shale, black carbonaceous, blocky
Lime, lt brn, vfxln

Lime, crm-lt brn, fn-vfxln, scattered fossils-crinoid segments and fusulinids

Lime, crm-lt brn, fn-micro xln, slight bedded chalk



○ Lime, crm-lt brn, fnxln, one chip scattered lt staining, NFO or odor

Lime lt brn, fn-micro xln

Lime, crm-lt brn, fnxln with bedded chalk, NS

Lime, lt-med brn, fn-vfxln, bedded chalk

Lime, lt-med brn, fn-vfxln

HEEBNER SHALE SPL TOP 3086-1193

Shale, black carbonaceous, fissile, blocky
Lime, lt brn, fn-micro xln

Shale, lime green-lt dove gray, soft sticky

TORONTO SPL TOP 3106-1213

Lime, white-crm, fnxln, bedded chalk, NS

Lime, crm-lt brn, fn-micro xln, lt red wash

Shale, red-reddish brn, soft mud-soft blocky, red chert in part

LKC SPL TOP 3135-1242

○ Lime, lt-med brn, fn-vfxln, scattered small vugs and fossil cast with lt staining, NFO or odor, lt oily sheen on chips

Lime, lt brn, fn-vfxln

○ Lime, lt brn, fn-vfxln, scattered oomolds and oolites, lt spotty staining, NFO or odor

Lime, lt brn, fn-micro xln, chalky

○ Lime, crm-lt brn, fn-vfxln, few chips with lt spotty staining, NFO or odor

Lime, crm-lt brn, fn-vfxln

Shale, black carbonaceous
Lime, lt brn with tint of gray, vfxln

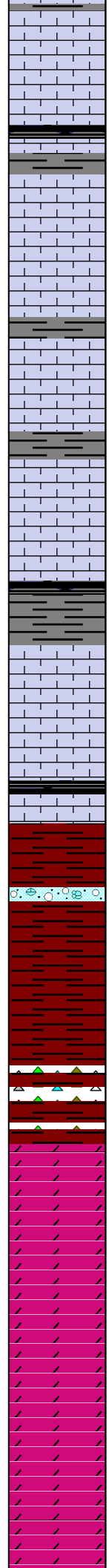
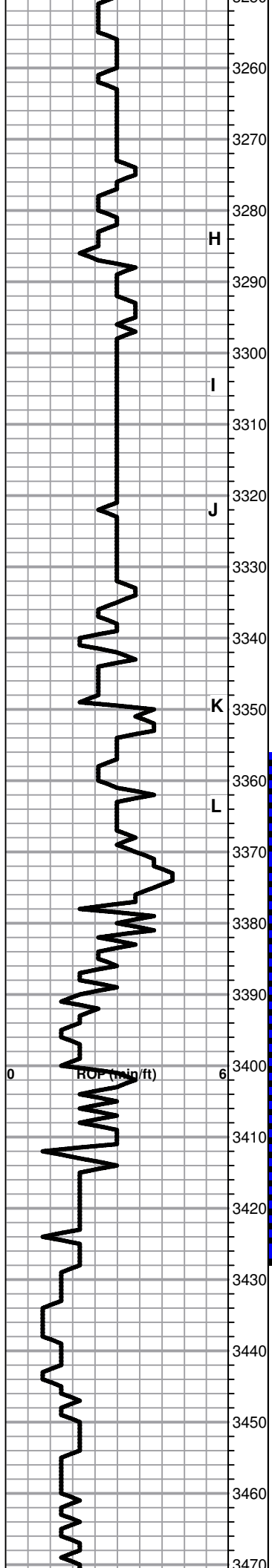
○ Lime, crm-lt brn, fnxln-granular, fn fossil casts, fragments, oolites and molds, scattered lt staining, NFO or odor

Lime, white-crm, fn-micro xln

Lime, white-crm, fn-micro xln, bedded chalk

Lime, fnxln-granular with bedded chalk, NS

Lime, crm-lt brn, fn-vfxln



Lime, offwhite-crm-lt brn, fn-micro xln

Lime, lt-med brn, fn-vfxln

Shale, gray-black carbonaceous

Lime, crm-lt brn, fn-vfxln, few chips hard granular, NS

Lime, crm-lt brn, fn-micro xln

Lime, white-crm, fn-vfxln

Lime, crm-lt brn, fn-micro xln

Lime, white-crm, fn-vfxln

Lime, crm-lt brn, fn-vfxln

Shale, gray-black carbonaceous, blocky

Lime, lt brn, fn-micro xln

Lime, lt brn, fn-micro xln

Lime, crm-lt brn, fn-vfxln

BKC SPL TOP 3366-1473

Shale, red-reddish brn, soft with red wash

Lime, clastic mix of lime and chert, stain in one chip in interparticle void, NFO or odor

Shale, red, soft mud with red wash

Shale, gray-reddish brn, soft mud with vari color chert fragments

Shale, reddish brn, cherty

ARBUCKLE SPL TOP 3411-1518

Dolomite, white-ivory, granular, lt odor with oil specks on crush

Dolomite, white-ivory to lt brn, granular, lt odor with show of oi specks on crush, lt to sat staining

Dolomite, white-ivory, fnxln-granular, no odor or show

Dolomite, white-ivory, granular, NS

Dolomite, white-ivory, fnxln-granular, NS

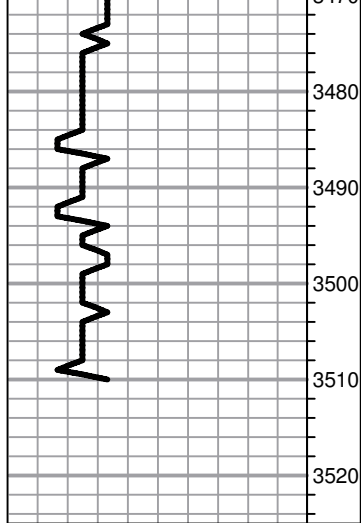
Dolomite, white-ivory, fnxln-granular

Dolomite, white-ivory, fnxln-granular

CFS 3360' AND PULL 30 STANDS FOR SHORT TRIP

DST # 1 3356' TO 3428' SEE HEADER FOR TEST SUMMARY

SLOPE 3/4 DEGREE @ 3428'



Dolomite, white-cream, fine-granular

Dolomite, white-ivory, fine-granular

Dolomite, white-ivory, fine-granular

RTD 3510-1617